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EXTENSION WORK IN AGRONOMY, 1923

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INTRODUCTION

Extension work in agronomy in 1923 resulted in fundamental progress in soil and crop improvement, as indicated by the number of adult result or long-time demonstrations carried on by farmers. (Fig. 1.) These demonstrations, which were to a large extent concerned with improved production, increased from 108,955 in 1922 to 161,456 in 1923, or approximately 48.2 per cent.

Work in crops was conducted along two important lines in 1923: (1) Economical production of feed for livestock, including legumes, grain, silage, dry-land feeds, and improvement of pastures, and (2) improvement of seed, including varietal demonstrations, standardization, development of sources of seed, and seed certification. In addition, work on the improvement of special crops, such as potatoes, tobacco, and cotton, was carried on in a few States.

Work in soils was also conducted along two important lines: (1) De-

velopment of the use of lime or limestone, including demonstrations, development of marl beds and other local sources of lime, establishment of local storage bins, and campaigns for the use of more limestone; and (2) fertilizers, including the standardization of formulas to encourage the use of high-quality goods.

DEVELOPMENT

Agronomy extension was strengthened in Missouri by combining the field work in soils and crops. Field work in New York and Ohio had been combined previously. The plan adopted in Missouri is similar to that used in Ohio, where field activities are supervised at the college by one man in charge of each line of work. Missouri was divided into districts, each headed by an extension agronomist, as is the case in Ohio. Such an organization tends to eliminate duplication of travel, and increases the efficiency of the workers in meeting the needs of farmers.

Two important national and interstate conferences of agronomy extension workers were held, one in New York in June, solely for discussion of subject matter, and one in Chicago in November, at the time of the International Hay and Grain Show, for consideration of extension methods.

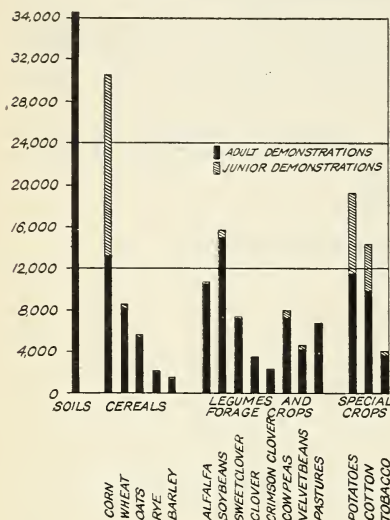


FIG. 1.—Number of result demonstrations in agronomy conducted in 1923 by county extension agents with the assistance of extension agronomists

The conference in New York was held at the State experiment stations at Geneva and Ithaca, and was attended by the extension agronomists of Connecticut, Vermont, New Jersey, Pennsylvania, and New York. Its purpose was to study and discuss the investigations being carried on by experiment stations in New York, and the adaptation of their results to the extension program of that State. The first conference of this kind was held in Rhode Island in 1922. The extension agronomists in attendance from other States used their detailed studies of the application of the New York investigations to the local extension field in furthering coordination in their own States.

The conference in Chicago was the outgrowth of a small informal gathering of extension agronomists at the International Hay and Grain Show in 1922, as the result of which a committee was appointed to prepare a program for a conference in 1923. This program was prepared by the specialists themselves, and dealt entirely

with problems relating to methods of conducting agronomy extension work. The conference was attended by 33 persons, including 22 specialists, 3 heads of crop departments of various colleges, a State leader, 2 county agents, and 5 members of the research staffs of various colleges. In all, 17 States were represented, ranging from Virginia and Maryland in the East to Oklahoma and New Mexico in the South and Idaho and Montana in the West.

Both of these conferences made it possible for specialists in various sections of the country to become intimately acquainted and to correspond more readily with one another. They were useful also in giving definite form to the solving of problems of more than State-wide interest and in speeding up the entire extension program.

In addition to State extension specialists and supervising agents, 1,971 county agricultural agents and 57 county club agents took part in promoting the work. (Fig. 2.) County agricultural agents reported that a total of 122,362 days, or 13.2 per cent

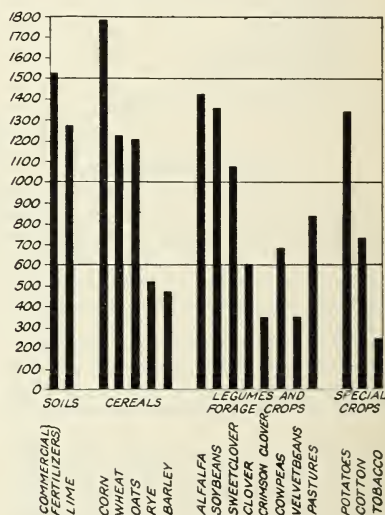


FIG. 2.—Number of county extension agents reporting extension work in soils and crops, 1923

of their time, was spent on agronomy projects. During this time they conducted 161,456 adult demonstrations, or 22.4 per cent of all demonstrations conducted in extension work. Through these demonstrations and by means of tours and other methods of extension they were able to influence

1,322,427 farmers to change practices, or 24.2 per cent of all the farmers changing practices due to extension work. (Fig. 3.) In 1923, 37,933 junior demonstrations were carried on in various agronomy projects by farm boys and girls enrolled in junior extension clubs, the most important being the corn, potato, and cotton clubs.

The work of these county extension agents was largely influenced and reenforced by that of the State agronomy specialists. In 39 States, 69 full-time and 22 part-time extension specialists were employed. Agronomy extension in both crops and soils was carried on in all 48 States, but this report deals primarily with the work as reported in 39 States where extension specialists were employed. Data on the number of demonstrations and value of the work as summarized from the reports of county agricultural agents are included, however, for all States. The total of funds expended from all sources for agronomy extension for the fiscal year ended June 30, 1923, was \$388,279.58.

In developing such extension service in the various States, agronomy specialists did not, as a rule, work directly with farmers in carrying on demonstrations. They assisted in studying the needs of the States to find the fundamental crop and soil problems that needed attention, and in cooperation with the subject-matter departments of the colleges determined upon the solutions of these problems. They then cooperated with county agents in making plans for conducting demonstrations with farmers, the actual demonstrations with adults or juniors being conducted by county agents.

The specialists assisted county agents in planning and laying out demonstrations, in working out campaigns for the adoption of practices when the work was advanced far enough, and in obtaining necessary publicity for campaigns and demonstrations. They also attended demonstration meetings and tours and aided in campaigns to further the agronomy program of the county.

Agronomy specialists assisted extension directors, State leaders, and specialists in allied subjects in studying State-wide problems in planning the extension program, where specialists in more than one subject were needed in solving such problems. They worked with other specialists in making plans for the work and determin-

ing just what part of the program each specialist should have. Agronomy specialists prepared forms for the use of county agents and demonstrators in reporting work in agronomy and summarized the results of such work.

CAMPAIGNS

A special feature of agronomy extension work was the waging of campaigns to obtain the adoption of better practices by farmers in lines of work which had been proved sound in the community. It was considered that the mere demonstration of the value of various good practices to farmers was not enough, that it must be followed by definitely planned cam-

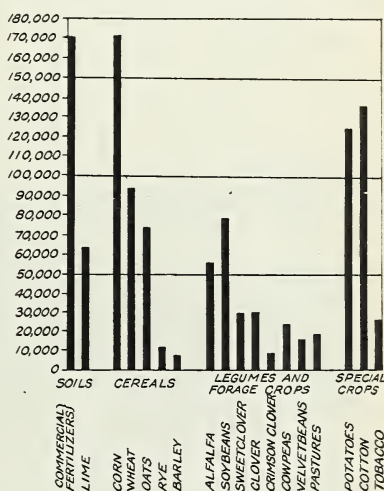


FIG. 3.—Number of farmers adopting new or improved practices in agronomy in 1923, as a result of cooperative extension work

paings to arouse more interest and to get the people actually to put into practice the lessons that had been so carefully planned and demonstrated.

Among the outstanding campaigns were the clover-prosperity campaign in Missouri, the campaign to encourage the production of more home-grown roughage in Wisconsin, and the alfalfa-dairy campaign in Michigan. Each of these had as its object the development of more home-grown leguminous feeds for livestock. They were most successful when carried on by the combined efforts of the extension agronomist and the livestock or dairy specialist. Such campaigns not only brought to the people the value of the work, but also made it possible for

them to obtain easily materials for increasing the legume acreage on the farm. It was also found possible to increase the quantity of lime or limestone used by bringing the need to the attention of farmers in terms of increased feed production. The methods of conducting some of these campaigns are discussed in the following pages.

CROP IMPROVEMENT

Farmers in the principal consuming areas found it necessary to grow more and better feed crops because of a decline in the price of wheat and

acres, but it is estimated that 2,000,000 acres will be required to furnish enough alfalfa for the dairy industry of the State. In Michigan the acreage increased from 193,000 acres in 1922 to more than 350,000 acres in 1923. The expansion of alfalfa production in the northern dairy States is indicated by the fact that in Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, New York, Ohio, and Wisconsin, during the period from 1919 to 1923, inclusive, the area increased 670,509 acres, or 76.3 per cent.

In addition to a large number of demonstrations with alfalfa, the cam-

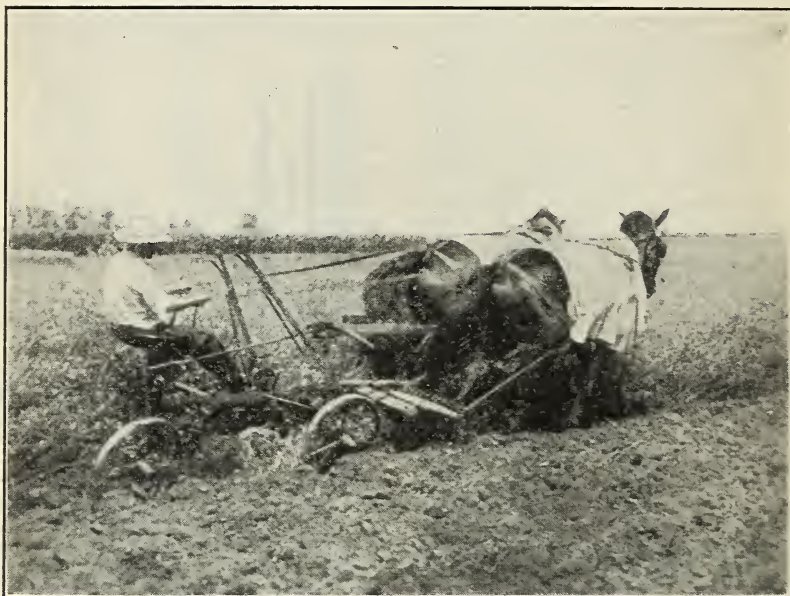


FIG. 4.—Demonstration in turning under sweet clover for green manure. During 1923, as a result of demonstrations by extension agents, 57,429 farmers plowed under 710,079 acres of green-manure crops. (Photograph furnished by South Dakota Extension Service)

an increase in freight rates. Legumes were predominant in the program for producing more economical feed.

LEGUMES

Extension activities with legumes centered largely on alfalfa and soy beans, although clover continued to be a favorite legume in many States. (Fig. 4.) Alfalfa demonstrations emphasizing the value of hardy northern-grown seed for the principal dairy States were continued. In some States this work progressed to the point where campaigns were carried on to increase alfalfa acreage. The acreage in Wisconsin increased 70 per cent, or 60,000

paings carried on in a number of these States to spread the results of demonstrations have been largely responsible for the increases in acreage. The clover-prosperity campaign in Missouri is an example of a well-organized campaign. In order to have a slogan the word "clover" was used, although in practice whatever legume was best suited to the locality was advocated. In preparing for the campaign in a county, a series of 30 short stories was prepared for release in local newspapers, beginning six weeks previous to the meeting. Letters were written for the agent to send to the leading farmers in his county, and

committees were appointed to select locations and make arrangements for the meetings. Colored stickers for automobile windshields and window cards were also used to call attention to the meetings.

In most counties the campaign lasted two days. Three specialists, in crops, soils, and home economics, respectively, traveled in a truck from county to county, carrying exhibit material to be used at the meetings. Wherever possible, meetings were held on farms where clover or some other legume was being properly grown. All-day meetings were held, and in most cases a basket lunch was brought by the farm women attending. While the women were not busy in the preparation of the lunch, the home-economics specialist conducted demonstrations and discussed various subjects of interest to them. In the clover-prosperity meetings the crop specialist discussed the value of clover and other legumes as feed crops, using exhibits and local fields as examples, and emphasized the importance of good seed and proper culture. After this talk the soil specialist discussed soil requirements for the production of good legume crops, dealing with such problems as those of lime and phosphate fertilizers.

The truck carried display tables upon which samples of lime, limestone, rock phosphate, acid phosphate, various legume seeds of the best quality, inoculation material, and soil-testing apparatus were placed. Wall-board frames were also provided, on which charts and pictures were mounted.

Whenever possible, local features were worked into the program, especially essay contests between boys and girls on subjects such as "Why clover means prosperity," and to some extent amusement features such as horseshoe pitching and nail driving. A series of newspaper articles urging the people to buy limestone and to procure good legume seed was prepared for each county and published during the six weeks following the meetings.

The plan described above is for the first or propaganda step. The other two steps are the demonstrations and the campaign to stimulate adoption of the better practices demonstrated.

In planning the demonstrations, the Missouri specialists took advantage of the interest aroused by the propaganda, and through the county agent called a conference of 75 to 100 selected farmers, including representa-

tives were invited to the county headquarters for an all-day meeting, with free lunch served by some organization such as the commercial club or rotary club. Where that was not possible, a church served lunch at a nominal charge.

Before attending the conference each delegate was requested to fill in a blank form listing problems in legume production suggested by farmers in his district. At the morning session these suggestions were studied and tabulated, and plans for demonstrations were discussed. In the afternoon, the suggested plan for demonstrations was presented and adopted by the delegates. In this manner a group of men representing the entire county approved the program. The campaign for adopting the better practices demonstrated followed.

In some other States, farmers signed during the first series of meetings, agreeing to buy limestone and grow good legumes. This plan was very successful in Wisconsin, Michigan, and Maine. The report from Maine showed that the success of campaigns in that State was in exact proportion to the percentage of people that signed the agreement to carry out the work as originally outlined.

The soy bean is probably the most popular of our newer legumes. (Fig. 5.) It fits easily into a rotation as a cultivated crop; it can be used for soil improvement, hay, grain, and concentrated feed; and each year a larger acreage is planted with corn for hogging off. In one or two States the soy-bean oil industry has been developed to some extent, but this may never become important except as a means of disposing of the surplus above what is needed for feed and seed.

Extension agents reported a large increase in the number of farmers changing practices in soy-bean culture and in the number of demonstrations conducted in growing soy beans. They reported that 79,824 farmers, or 40.5 per cent increase over 1922, changed practices in soy-bean culture, and that 14,914 adult demonstrations, or 84.4 per cent increase over 1922, were conducted in growing soy beans.

In most States the work with soy beans consisted in demonstrations to show farmers the varieties best suited to various localities and in developing definite areas for seed production. Probably the lack of seed of the right varieties more than anything else retarded the increase in acreage of this crop.

GRAIN AND SILAGE

Extension work with grain and silage was carried on in a number of States. Demonstrations in corn production were held in 47 States, and in oats production in 46 States. Corn development made great progress in Colorado, Idaho, Montana, New Mexico, Oregon, Washington, and Wyoming. The work consisted principally in demonstrating to farmers the possibility of growing corn at high altitudes and under dry-farming conditions, and in demonstrating the right variety of corn for various sections.

corn added materially to the feed in the county, much of which is range.

The Eastern States, faced with the necessity for developing cheaper dairy feeds, have stressed the use of improved varieties of corn for silage. This work received considerable attention, especially in Delaware, Maryland, New York, Pennsylvania, Vermont, and West Virginia.

A good example of the silage work is the standardization of varieties in Pennsylvania. Five or six years ago the extension specialists in this State began to develop varieties of silage



FIG. 5.—Demonstration in soy bean growing on dry lands in Colorado. Extension agents gave considerable attention to the growing of legumes and forage crops during 1923. More than 15,000 adult and junior demonstrations with soy beans were held, and nearly 80,000 farmers changed their practices of soy-bean culture. (Photograph furnished by Colorado Extension Service)

The increase in corn acreage that has taken place in Montana is typical of corn development in the West. In 1900 less than 1,600 acres of corn were grown in the State. In 1922 the acreage had increased to 228,000, and in 1923 to 365,000. Corn has been grown in Montana not only on irrigated land but in the higher dry sections. In Fergus County no corn was grown when extension work was started in 1913. In 1914 the county agent succeeded in getting 12 farmers to grow 200 acres. A survey made in that county during 1923 indicated that the work has had a steady growth and that in 1923 more than 3,500 acres of

corn in some of their better corn counties to be shipped into the mountainous sections of the State and grown as silage. This work has developed until they not only are supplying every section of their own State with good silage seed corn, but also are regularly shipping large quantities to New England. Lancaster Surecrop and Golden Nugget are two leading varieties in this section. Extension agents in New England, cooperating with local farm organizations and the Eastern States Farmers' Exchange, pooled orders and purchased seed corn through the co-operative-marketing associations in Pennsylvania. The production of Lan-

caster Surecrop seed has developed to the point where an association has been organized in Chester and Lancaster Counties, Pa., for the distribution of the crop.

IMPROVEMENT OF PASTURES

As an important factor in economical feed production, pasture improvement was carried on in 45 States. In New England and some North Central States it consisted primarily in improving permanent pastures by means of fertilization, cultivation, and reseeding. This work has been under way for approximately three years, and is beginning to show some excellent results. Probably the most intensive work in pasture improvement was done in eastern Ohio, where 709 pasture-improvement demonstrations were held.

Approximately half of the total area of Ohio has been devoted to the grazing of livestock, most of which is in the hilly section of the eastern part of the State. The pastures in this region have been grazed until, on many of them, from 4 to 6 acres are required to support one animal unit. Demonstrations have shown that these pastures can be improved rapidly and successfully by a very simple treatment, that of using limestone to correct the acidity and acid phosphate to furnish plant food. On some of the poorest pastures the seeding of a little alsike and white clover is recommended; and where the poverty grasses are very heavily matted and the hillsides are not too steep, disking and harrowing are advised.

Meetings were held on inspection tours in 11 of the eastern counties in Ohio. Each man present was requested to fill out a card asking him to estimate the carrying capacity of treated and untreated pastures, to indicate if he intended to treat his pastures in 1924, and to give his name and address. As a result of this inquiry it was estimated that an average of 4.5 acres of untreated pasture was required per animal unit, as compared with 1.5 acres of treated pastures. Nearly half of the farmers attending these meetings signified their intention to treat a portion of their pastures the following year.

One of the serious drawbacks to the growth of the livestock industry in the South has been the lack of pasture. The object of developing a permanent pasture in the South is to have one that will maintain livestock for as long a period during the year as pos-

sible. Farmers in many sections of the Southern States have found that they can have excellent pasture for 8 to 10 months of the year by seeding a mixture of various grasses, including carpet grass, dallis grass, and lespedeza.

In Alabama, as a result of pasture-improvement demonstrations in 14 counties, 14,305 acres of pasture were improved and 504 new pastures established. The average grazing period was 278 days, the average size of the pasture 25 acres, and each acre fed an average of 1.4 animal units. The feed value of the improved pastures was 4.18 times that of the average native pasture.

TOBACCO

In a number of States tobacco is an important crop in the field of the extension agronomist, and during the last three years extension work with tobacco in these States has developed rapidly. The general tendency to organize the selling of tobacco in various sections has brought a realization of the need for improving and standardizing the tobacco crop. The important extension activities were (1) development of disease-resistant strains, (2) varietal standardization, and (3) increasing the quality of tobacco by improving the soil.

The crop specialist in Kentucky reported that fully 50 per cent of his time was spent in work with the tobacco industry, chiefly in demonstrations to show the value of root-rot resistant tobacco. (Fig. 6.) Kentucky carried on 1,985 demonstrations in 72 counties. The work received active support and much publicity from the tobacco-seed trade.

Because of profitable prices the farmers of central Tennessee have standardized to a large extent on burley tobacco. Reports for 1923 indicate that more than 4,000 farmers in the Knoxville area alone were interested in burley tobacco and grew more than 36,000 acres of this crop. Poor quality of tobacco, due to a lack of organic matter in the soil, was one of the big problems. It was found that tobacco grown on well-limed clover sod brought a return of \$25 to \$75 more per acre than tobacco grown on similar land that had not been in clover. A campaign entitled "Clover for tobacco" was therefore started to get the farmers of central Tennessee to use more lime and sow more clover in order to increase acre yields of tobacco.

In carrying on the "clover-for-tobacco" campaign an effort was made to reach all the people interested in the work. Conferences were held with district extension agents, county agents, the Eastern Tennessee Tobacco Association, and leaders of agricultural work in the various counties. A circular letter outlining the plan of work was then prepared and sent to each of these leaders. A complete mailing list of all the tobacco growers in the State was obtained, and a circular letter was sent by the county agent to every grower in his county. In counties without agents the district extension agent signed the letters. Representatives of the extension serv-

time in the summer another letter was sent, giving instructions for August seeding.

In this way the extension service kept in close touch with all the men cooperating in the project. Reports indicate that copies of these circular letters were sent regularly to 4,000 men interested in tobacco in the Knoxville district of Tennessee. Many of these people were reached in meetings and field demonstrations and through personal contact with extension workers. The workers kept clearly in mind the importance of soil improvement in growing tobacco, and they were able to do the work themselves and to teach it to others.



FIG. 6.—Comparative demonstration in growing Burley tobacco. The well-developed tobacco at the left was grown from root-rot resistant seed and that at the right from the common or nonresistant seed. County agents in 22 tobacco-growing States held 3,570 demonstrations in improvement of tobacco during 1923. In all, 26,473 farmers were influenced to change their practices of tobacco culture. (Photograph furnished by Kentucky Extension Service)

ice and of the tobacco associations were present at every meeting of the farmers. They explained the work planned and if possible got the farmers to sign cards agreeing to follow the program for clover production as outlined.

A third circular letter was then sent to each person who had signed a card, giving him the names of the other men in his neighborhood who had signed cards. This was followed by a fourth letter, with a cooperative-project outline. All the work was done in January and the first half of February. On February 26 a fifth letter was sent to these growers, giving definite instructions for the spring seeding of clover; and at the proper

County agents in 22 tobacco-growing States reported 3,570 demonstrations in tobacco improvement.

SEED IMPROVEMENT

One of the most important problems in agronomy, if not the most important, is the improvement of seed for the production of better crops. Farmers in all sections of the country are realizing more and more the necessity for using seed of high quality, free from varietal mixtures, of known origin, and adapted to the region in which the crop is grown. On many farms the question of profit or loss in the production of a crop depends upon the seed that is used. For a

number of years, demonstrations have been held to show farmers the varieties of crops best adapted to local conditions. Much of this work, however, was not effective because no effort was made to develop simultaneously a source of good seed of the varieties that were being demonstrated.

Probably the most important phases of seed improvement were (1) the standardization of varieties in various localities, (2) development of sources of seed, and (3) seed inspection and certification.

Work in standardizing varieties was done with almost all kinds of field crops, including corn, small grains, potatoes, and grass seeds. More people than in previous years paid special attention to the source from which seed was obtained as well as to its quality and uniformity.

A good example of standardization of grain crops is the work that was done in Idaho with Dicklow wheat. Several years ago the Aberdeen substation in Idaho found through investigation that this variety was superior to any other for the irrigated sections of southern Idaho. A small supply of seed was put out in various sections of the State for five years, in order to develop sources of seed. The extension service in Idaho has been largely responsible for the distribution of this wheat, which has proved of such excellent quality that in 1923 at least 75 per cent of all the wheat grown in the irrigated sections of southern Idaho was Dicklow. The county agent in Twin Falls County stated last summer that, to the best of his knowledge, every acre of wheat grown on the irrigated lands of Twin Falls County was of this variety. This made it possible to fill orders from other sections for carloads of seed of absolutely pure Dicklow wheat with no opportunity for mixture. Millers in Twin Falls and other sections, because of this standardized variety, were able to produce a flour of excellent quality and uniform texture. As one miller stated, he was able to fill his entire elevator with wheat of uniform quality and grade, and for this reason could afford to pay more money for Dicklow wheat than for mixed wheats.

INSPECTION AND CERTIFICATION OF SEED

Seed inspection and certification is an additional step in crop improvement. The principal object is to develop sources of high-quality seed of

known origin, to be used primarily in the localities in which it is grown. In some States, however, seed inspection and certification is conducted on a commercial basis, and seeds are sold to distant localities.

During the first years of the work seed inspection and certification was almost entirely a college and extension activity. The men representing the State agricultural colleges made field inspections of the growing grain and examined samples of seed after threshing, and the institution issued certificates of purity.

A more recent development in a number of States has been that when the work reached commercial proportions an association of growers assumed responsibility for the work, including the expense of inspection and certification. The colleges have kept in close touch with the activity, training responsible men for the work of inspection, developing original sources of pure seed as parent stock, and seeing that the quality of certified seed offered for sale is kept at a high standard (fig. 7).

The development of seed inspection and certification in Michigan is a good example of this work. Other States are doing their inspection and certification on much the same basis with minor modifications to fit local conditions.

Some 12 or 15 years ago the experiment station in Michigan began to produce improved strains of cereals and other crops, with the object of raising the standard of the seed used by the average farmer in Michigan. When the extension work started in Michigan in 1913 this at once became a popular project with the county agents. Demonstrations in the value of improved seeds were conducted in all sections of the State, and as a result the present system of seed improvement and distribution has developed.

At present the work is divided among three distinct agencies, all cooperating to the same end. The Michigan extension service and experiment station are both interested in the development of parent stocks of grains of high quality and in conducting demonstrations to show the value of these high-quality seeds to the farmer. The second agency, the Michigan Crop-Improvement Association, an organization of farmers of the State, takes up this work after the demonstrations have been conducted. Through its assistance the seed supply is increased, and the seed is inspected and certified

for distribution. The extension service works in close cooperation with this organization in order to note the kind of seed that should be distributed, to keep the seed grown and distributed of a high quality, and to train inspectors for the work of field and bin inspection. These inspectors examine thoroughly every acre of the fields that are offered for inspection. They then make their reports to the executive committee of the crop-improvement association. If a report is such that the field can not be certified, the farmer is notified at once. If the field is in good condition with reference to varietal mixtures, weeds,

and storing the grain, and in this way is able to perform the service for farmers at a minimum cost.

The primary object of seed improvement is not to assist a few farmers in developing a market for high-quality seed that they may produce. Such assistance is always important, but the principal aim in any State is to improve the quality of seed every farmer uses. The work has been further strengthened through the support given it by the International Crop Improvement Association. This association has been instrumental in developing standard rules and requirements for different crops, and the



FIG. 7.—Inspecting seed in a wheat field. Inspection and certification of seed has reached commercial proportions in some States, and the marketing of the seed is being handled by associations of growers. Original sources of pure seed as parent stock are developed, and the quality of certified seed offered for sale is kept at a high standard. (Photograph furnished by Idaho Extension Service)

and the like, the farmer is notified that his field has passed the inspection, and instructions are given him for harvesting and threshing the grain to keep it free from mixtures. He is required to furnish a sample of his wheat, uncleaned, to the secretary of the association. This sample is inspected and cleaned, and if it passes the final test, the farmer's grain is certified for sale by the association.

The third agency is the seed department of the Michigan Farm Bureau, which is undertaking to clean, grade, and distribute this seed, first to the farmers of Michigan and next to farmers desiring the seed who live outside the State. The farm bureau seed department has the latest type of machinery for cleaning, sacking,

rules have been accepted by most of the States.

SOIL IMPROVEMENT

The principal work in soil improvement is naturally divided into (1) developing sources of lime or limestone, and (2) standardization of high-analysis fertilizers.

LIME OR LIMESTONE

In some States the use of lime or limestone in growing better legume crops has gone beyond the demonstration stage, and in many sections it has become a common practice. A total of 63,719 farmers, or an increase of 32.7 per cent over 1922, changed their prac-

tice with reference to the use of limestone. The principal problem was shown to be an economic and physical one, that of buying limestone and making it available to the farmer at the time of the year when he can haul and spread it on his fields. (Fig. 8.) Most of the work was in aiding farmers in developing economical sources of supply and in campaigns to increase the actual use of limestone. County agents reported that 46 States carried on work in this phase of soil improvement.

In a number of States, as more attention was given to developing local sources of lime and making it convenient for farmers to procure it, the quantity used increased proportionately. Kentucky, Missouri, and Wisconsin were conspicuous examples of States that developed local sources of lime or limestone.

The development of marl beds as a source of lime was important in Kentucky, Michigan, Pennsylvania, and Wisconsin. Probably the most important piece of work with limestone, not only in Kentucky but in the entire Middle West, was the location of marl deposits in central Kentucky and the development of their use. Samples taken from these marl beds showed that a number of them were running more than 50 per cent calcium carbonate, and steps were taken to encourage the use of marl from such beds. In Kentucky, at the close of the year, 112 small community crushers for the crushing of limestone were in operation. County agents reported that in 1923, 37,738 tons of lime from all sources were used in Kentucky.

FERTILIZERS

The fertilizer work was a continuation of that which was started in 1921 to standardize formulas and to encourage the use of high-analysis goods. In some States as many as a hundred different brands were sold, many of which contained a very small percentage of plant food. With a majority of the farmers the price was the controlling factor in the selection of a fertilizer. Few farmers of their own volition studied the question to determine which was most profitable. Higher freight rates increased the necessity for eliminating many of the low-analysis formulas.

During 1923, 12 States conducted definite work on standardizing formulas and stimulating the use of high-analysis fertilizers. Conferences were held with manufacturers, and almost

all of them cooperated heartily in the movement. A weak point in the campaign was the local agent. Although there was no more profit for the local agents in selling the lower grades, many of them insisted on handling such material, largely because they had always handled low-priced brands.

To offset this practice Ohio began holding a series of fertilizer schools in 1921. The schools were organized by

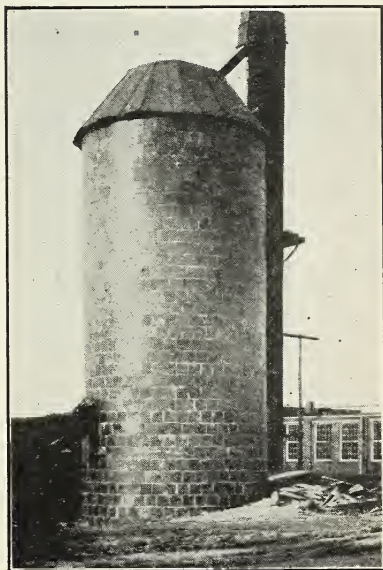


FIG. 8.—Elevator type of lime bin. In using such bins, lime is dumped from the railway car into a pit at the side of the bin and elevated by the motor-driven elevator shown at the right. When the bin is more than a third full, wagons can be loaded by gravity from the chute at the left. In order that lime would be readily available to farmers, community bins for the storage of lime from commercial quarries were constructed during the year, principally in Indiana, Ohio, and Virginia, where local deposits of lime are not available. (Photograph furnished by the Ohio Extension Service)

the county agent with the cooperation of the agronomy specialist. Farmers and local dealers were invited to attend. Sometimes the meeting was held in the storehouse of a dealer. The specialist discussed the problem of soil fertilization, outlining the general method for soil improvement in the local community. He then discussed the value of high-analysis fertilizers and the saving in freight by their use, and stated the needs of various crops for certain formulas. Af-

ter this the county agent discussed with the farmers the fertilizers they were intending to purchase, often getting them to pool an order for a carload of a certain high-analysis fertilizer and arranging at the meeting for the local dealer to order it for them. By having the meeting for both the dealer and the farmer, it was possible to get them into much closer working cooperation and to give them a clearer understanding of the saving accomplished by the purchase of high-analysis goods. These schools have had a strong influence in changing local practices, in sections where they have been held.

The standardization of formulas received much publicity in some States. Such recognized groups of fertilizers

as the "Ohio Standard Dozen" and the "Kansas Big Ten" have resulted. An indication of the reduction in number of fertilizers offered for sale was found in Connecticut, where the number was reduced from 64 to 9 formulas. Similar work effected an enormous saving on freight rates to farmers, especially in the Eastern and Southern States. In some of the formulas that have been adopted it is possible to get as much plant food out of one ton of high-analysis fertilizer as would be obtained from two tons of the average goods used by the farmer.

County agents reported that 170,059 farmers in 47 States followed their suggestions for the use of commercial fertilizers on 4,155,128 acres.

STATISTICAL SUMMARY OF RESULTS

TABLE 1.—*Agronomy extension activities, 1923*

Activity	Number	Agents reporting
Soils:		
Demonstrations.....	34, 550	1, 471
Farms changing practice relative to use of commercial fertilizers.....	170, 059	1, 524
Farms changing practice relative to use of lime or limestone.....	63, 719	1, 281
Cereals:		
Corn demonstrations—		
Adult.....	13, 153	1, 311
Junior.....	17, 293	901
Farms changing practice relative to corn culture.....	171, 080	1, 789
Wheat demonstrations—		
Adult.....	8, 025	793
Junior.....	279	45
Farms changing practice relative to wheat culture.....	94, 305	1, 227
Oats demonstrations—		
Adult.....	5, 295	722
Junior.....	219	42
Farms changing practice relative to oats culture.....	74, 422	1, 212
Rye demonstrations—		
Adult.....	2, 118	284
Junior.....	26	5
Farms changing practice relative to rye culture.....	12, 220	516
Barley demonstrations—		
Adult.....	1, 235	263
Junior.....	40	20
Farms changing practice relative to barley culture.....	8, 189	466
Legumes and forage crops:		
Alfalfa demonstrations—		
Adult.....	10, 354	988
Junior.....	52	12
Farms changing practice relative to alfalfa culture.....	56, 355	1, 427
Sweet-clover demonstrations—		
Adult.....	7, 090	686
Junior.....	27	4
Farms changing practice relative to sweet-clover culture.....	30, 123	1, 080
Clover (red, alsike, white) demonstrations—		
Adult.....	3, 432	364
Junior.....	3	2
Farms changing practice relative to clover culture.....	30, 860	603
Crimson-clover demonstrations—		
Adult.....	2, 227	233
Junior.....	13	3
Farms changing practice relative to crimson-clover culture.....	9, 709	344
Soy-bean demonstrations—		
Adult.....	14, 914	1, 067
Junior.....	638	63
Farms changing practice relative to soy-bean culture.....	79, 824	1, 363
Cowpea demonstrations—		
Adult.....	7, 117	554
Junior.....	586	40
Farms changing practice relative to cowpea culture.....	24, 599	680
Velvet-bean demonstrations—		
Adult.....	4, 110	294
Junior.....	409	23
Farms changing practice relative to velvet-bean culture.....	16, 597	344
Pasture demonstrations, adult.....	6, 737	658
Farms changing practice relative to pasture improvement.....	19, 205	838
Special crops:		
Potato demonstrations—		
Adult.....	11, 549	934
Junior.....	7, 830	462
Farms changing practice relative to potato culture.....	125, 401	1, 343
Cotton demonstrations—		
Adult.....	9, 820	645
Junior.....	4, 459	364
Farms changing practice relative to cotton culture.....	136, 239	732
Tobacco demonstrations—		
Adult.....	3, 570	186
Junior.....	332	41
Farms changing practice relative to tobacco culture.....	26, 473	237

STATISTICAL SUMMARY OF RESULTS—Continued

TABLE 2.—*Extension activities with field crops, 1923*

Crop	Adult demonstrations completed	Acreage involved	Club members doing crop work	Acreage involved	Farms using improved seed	Farms adopting better practices	Acreage involved
Corn.....	13, 153	176, 063	17, 293	23, 354	112, 561	171, 080	1, 421, 045
Wheat.....	8, 025	241, 701	279	1, 031	52, 909	94, 305	1, 292, 415
Oats.....	5, 295	72, 722	219	643	30, 531	74, 425	305, 482
Rye.....	2, 118	25, 616	26	43	6, 346	12, 220	69, 427
Barley.....	1, 235	15, 742	40	94	4, 436	8, 189	109, 000
Other cereals.....	1, 460	25, 015	1, 104	3, 092	10, 178	14, 590	150, 935
Clover (red, alsike, white).....	3, 432	26, 152	3	4	17, 240	30, 860	122, 012
Alfalfa.....	10, 354	84, 662	52	90	27, 196	56, 355	296, 358
Soy beans.....	14, 914	158, 439	638	655	33, 455	79, 824	564, 168
Cowpeas.....	7, 117	82, 739	586	894	7, 157	24, 599	187, 956
Sweet clover.....	7, 090	106, 357	27	57	12, 300	30, 123	238, 954
Crimson clover.....	2, 227	20, 208	13	13	3, 050	9, 709	74, 409
Velvet beans.....	4, 110	63, 163	409	739	4, 971	16, 597	169, 930
Beans.....	986	9, 285	396	380	3, 048	5, 349	43, 902
Peanuts.....	3, 162	29, 075	2, 048	2, 049	5, 066	15, 245	103, 340
Lespedeza.....	3, 144	43, 074	54	151	2, 267	10, 407	119, 218
Pasture.....	6, 737	92, 357	-----	-----	4, 602	19, 205	262, 984
Other feed crops.....	2, 988	28, 149	99	204	6, 163	14, 472	99, 056
Potatoes.....	11, 549	58, 710	7, 830	2, 828	60, 065	125, 401	248, 574
Sweet potatoes.....	3, 527	11, 005	1, 845	1, 106	8, 450	17, 810	41, 369
Cotton.....	9, 820	191, 598	4, 459	6, 103	60, 077	136, 239	1, 683, 530
Tobacco.....	3, 570	10, 278	332	284	6, 197	26, 473	52, 480
Other miscellaneous crops.....	893	11, 638	180	100	3, 706	5, 941	22, 527
Total, field crops.....	126, 906	1, 583, 748	37, 932	43, 914	481, 971	999, 418	7, 679, 474
Total, soil improvement.....	34, 550	606, 107	-----	-----	-----	323, 009	7, 497, 274
Total, all agronomy work.....	161, 456	2, 189, 855	37, 932	43, 914	481, 971	1, 322, 427	15, 176, 748

TABLE 3.—*Extension activities in soil improvement, 1923*

Activity	Number
Soil-improvement demonstrations completed.....	34, 550
Acres involved.....	606, 107
Farmers influenced to change farm practices relative to soil improvement.....	323, 009
Acres involved.....	7, 497, 274
Farmers following advice regarding commercial fertilizers.....	170, 059
Acres treated with commercial fertilizers.....	4, 155, 128
Farmers taking better care of farm manure.....	60, 743
Farmers plowing under green manure.....	57, 429
Acres of green-manure crops plowed under.....	710, 079
Farmers using lime or limestone according to advice.....	63, 719
Tons of lime or limestone used.....	808, 797

ORGANIZATION OF THE UNITED STATES DEPARTMENT OF AGRICULTURE

JUNE 27, 1925

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